

What is claimed is:

1. A display device comprising:

a pixel region with a plurality of pixel TFTs arranged in matrix; and

at least one source driver and at least one gate driver for driving said pixel region,

5 wherein of m bit digital video data inputted from the external, upper n bit data and lower (m - n) bit data are used as gradation voltage information and time gradation information, respectively, where m and n are both positive integers equal to or larger than 2 and satisfy $m > n$.

10 2. A device according to claim 1, wherein said m is 8 and said n is 2.

3. A device according to claim 1, wherein said m is 12 and said n is 4.

15 4. A device according to claim 1, wherein said display device is a liquid crystal display device.

5. A device according to claim 4, wherein a thresholdless anti-ferroelectric mixed liquid crystal is used for said liquid crystal display device.

20 6. A device according to claim 1, wherein said display device is an electroluminescence display device.

7. A rear projector provided with three display devices as claimed in claim 1.

25 8. A front projector provided with three display devices as claimed in claim 1.

9. A single panel type rear projector provided with one display device as claimed in claim 1.

10. A goggle type display provided with two display devices as claimed in claim 1.

11. A display device comprising:

a pixel region with a plurality of pixel TFTs arranged in matrix;

at least one source driver and at least one gate driver for driving said pixel region;

and

a circuit for converting m bit digital video data inputted from the external into n bit digital video data for gradation voltage, and for supplying said source driver with said n bit digital video data (m and n are both positive integers equal to or larger than 2, $m > n$), wherein one frame of image consists of 2^{m-n} sub-frames to perform time gradation display.

12 A device according to claim 11, wherein said m is 8 and said n is 2.

13. A device according to claim 11, wherein said m is 12 and said n is 4.

14. A device according to claim 11, wherein said display device is a liquid crystal display device.

15. A device according to claim 14, wherein a thresholdless anti-ferroelectric mixed liquid crystal is used for said liquid crystal display device.

16. A device according to claim 11, wherein said display device is an electroluminescence display device.

17. A rear projector provided with three display devices as claimed in claim 11.

18. A front projector provided with three display devices as claimed in claim 11.

19. A single panel type rear projector provided with one display device as claimed in claim 11.

20. A goggle type display provided with two display devices as claimed in claim 11.

21. A display device comprising:

a pixel region with a plurality of pixel TFTs arranged in matrix;

at least one source driver and at least one gate driver for driving said pixel region;

and

a circuit for converting m bit digital video data inputted from the external into n bit digital video data for gradation voltage, and for supplying said source driver with said n bit digital video data (m and n are both positive integers equal to or larger than 2, $m > n$),

wherein one frame of image consists of 2^{m-n} sub-frames to perform time gradation display, thereby obtaining $(2^m - (2^{m-n} - 1))$ patterns of gradation display.

22. A device according to claim 21, wherein said m is 8 and said n is 2.

23. A device according to claim 21, wherein said m is 12 and said n is 4.

24. A device according to claim 21, wherein said display device is a liquid crystal display device.

25. A device according to claim 24, wherein a thresholdless anti-ferroelectric mixed liquid crystal is used for said liquid crystal display device.

26. A device according to claim 21, wherein said display device is an electroluminescence display device.

27. A rear projector provided with three display devices as claimed in claim 21.

28. A front projector provided with three display devices as claimed in claim 21.

29. A single panel type rear projector provided with one display device as claimed in claim 21.

30. A goggle type display provided with two display devices as claimed in claim 21.

31. A display device comprising

a pixel region with a plurality of pixel TFTs arranged in matrix and at least one source driver and at least one gate driver for driving said pixel region, wherein of m bit digital video data inputted from the external, upper n bit data and lower (m - n)bit data are used as gradation voltage information and time gradation information, respectively (m and n are both positive integers equal to or larger than 2, m > n), and

wherein said source driver has a D/A converter circuit for converting said n bit digital video data into analog gradation voltage.

32. A device according to claim 31, wherein said m is 8 and said n is 2.

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33. A device according to claim 31, wherein said m is 12 and said n is 4.

34. A device according to claim 31, wherein said display device is a liquid crystal display device.

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35. A device according to claim 34, wherein a thresholdless anti-ferroelectric mixed liquid crystal is used for said liquid crystal display device.

36. A device according to claim 31, wherein said display device is an electroluminescence display device.

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37. A rear projector provided with three display devices as claimed in claim 31.

38. A front projector provided with three display devices as claimed in claim 31.

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39. A single panel type rear projector provided with one display device as claimed in claim 31.

40. A goggle type display provided with two display devices as claimed in claim 31.

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41. A display device comprising:

a pixel region with a plurality of pixel TFTs arranged in matrix;

at least one source driver and at least one gate driver for driving said pixel region;

and

a circuit for converting m bit digital video data inputted from the external into n bit digital video data for gradation voltage, and for supplying said source driver with said n bit digital video data (m and n are both positive integers equal to or larger than 2, $m > n$),

wherein said source driver has a D/A converter circuit for converting said n bit digital video data into analog gradation voltage, and

wherein one frame of image consists of 2^{m-n} sub-frames to perform time gradation display.

42. A device according to claim 41, wherein said m is 8 and said n is 2.

43. A device according to claim 41, wherein said m is 12 and said n is 4.

44. A device according to claim 41, wherein said display device is a liquid crystal display device.

45. A device according to claim 44, wherein a thresholdless anti-ferroelectric mixed liquid crystal is used for said liquid crystal display device.

46. A device according to claim 41, wherein said display device is an electroluminescence display device.

47. A rear projector provided with three display devices as claimed in claim 41.

48. A front projector provided with three display devices as claimed in claim 41.

49. A single panel type rear projector provided with one display device as claimed in claim 41.

50. A goggle type display provided with two display devices as claimed in claim 41.

51. A display device comprising:
a pixel region with a plurality of pixel TFTs arranged in matrix;
at least one source driver and at least one gate driver for driving said pixel region;
and
a circuit for converting m bit digital video data inputted from the external into n
bit digital video data for gradation voltage, and for supplying said source driver with said n
bit digital video data (m and n are both positive integers equal to or larger than 2, $m > n$),
wherein said source driver has a D/A converter circuit for converting said n bit
digital video data into analog gradation voltage, and
wherein one frame of image consists of 2^{m-n} sub-frames to perform time gradation
display, thereby obtaining $(2^m - (2^{m-n} - 1))$ patterns of gradation display.

52. A device according to claim 51, wherein said m is 8 and said n is 2.

53. A device according to claim 51, wherein said m is 12 and said n is 4.

54. A device according to claim 51, wherein said display device is a liquid crystal display device.

55. A device according to claim 54, wherein a thresholdless anti-ferroelectric mixed liquid crystal is used for said liquid crystal display device.

56. A device according to claim 51, wherein said display device is an electroluminescence display device.

57. A rear projector provided with three display devices as claimed in claim 51.

58. A front projector provided with three display devices as claimed in claim 51.

59. A single panel type rear projector provided with one display device as claimed in claim 51.

60. A goggle type display provided with two display devices as claimed in claim 51.

61. A display device comprising:

a pixel region with a plurality of pixel TFTs arranged in matrix;
at least one source driver and at least one gate driver for driving said pixel region;

a circuit for converting m bit digital video data inputted from the external into n bit digital video data for gradation voltage (m and n are both positive integers equal to or larger than 2, $m > n$); and

a D/A converter circuit for converting said n bit digital video data into analog video data to input the converted data to said source driver,

wherein one frame of image consists of 2^{m-n} sub-frames to perform time gradation display.

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62. A device according to claim 61, wherein said m is 8 and said n is 2.

63. A device according to claim 61, wherein said m is 12 and said n is 4.

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64. A device according to claim 61, wherein said display device is a liquid crystal display device.

65. A device according to claim 64, wherein a thresholdless anti-ferroelectric mixed liquid crystal is used for said liquid crystal display device.

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66. A device according to claim 61, wherein said display device is an electroluminescence display device.

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67. A rear projector provided with three display devices as claimed in claim 61

68. A front projector provided with three display devices as claimed in claim 61.

69. A single panel type rear projector provided with one display device as claimed in claim 61.

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70. A goggle type display provided with two display devices as claimed in claim 61.

71. A display device comprising:

a pixel region with a plurality of pixel TFTs arranged in matrix;

at least one source driver and at least one gate driver for driving said pixel region;

a circuit for converting m bit digital video data inputted from the external into n bit digital video data for gradation voltage (m and n are both positive integers equal to or larger than 2, $m > n$); and

a D/A converter circuit for converting said n bit digital video data into analog video data to input the converted data to said source driver,

wherein one frame of image consists of 2^{m-n} sub-frames to perform time gradation display, thereby obtaining $(2^m - (2^{m-n} - 1))$ patterns of gradation display.

72. A device according to claim 71, wherein said m is 8 and said n is 2.

73. A device according to claim 71, wherein said m is 12 and said n is 4.

74. A device according to claim 71, wherein said display device is a liquid crystal display device.

75. A device according to claim 74, wherein a thresholdless anti-ferroelectric mixed liquid crystal is used for said liquid crystal display device.

76. A device according to claim 71, wherein said display device is an

electroluminescence display device.

77. A rear projector provided with three display devices as claimed in claim 71.

5 78. A front projector provided with three display devices as claimed in claim 71.

79. A single panel type rear projector provided with one display device as claimed in claim 71.

10 80. A goggle type display provided with two display devices as claimed in claim 71.